

## GLACIER EVOLUTION OF NEVADO HUAYTAPALLANA SINCE THE LITTLE ICE AGE, APPLYING GEOMORPHOLOGICAL RECORDS

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### ABSTRACT

The aim of this work has been to assess the deglaciation of Nevado Huaytapallana (11°53'S, 75°, 03'W, 5558 m), the summit of a mountain range that extends along 18 km, with NW-SE direction in the Amazonian slope of the Eastern Central Andes of Peru. To this purpose, a geomorphological map has been made, defining the landforms generated by the last glacier advance. In the absence of absolute dating, it has been considered that this last expansion ended during the Little Ice Age (PEH), the last known phase of glacial advance on the Earth which came to an end in the 19th century. The geomorphological map has been made by drawing the glacier extension at the PEH in 1962 (using aerial photographs) and in 2016 (on a satellite image). The demarcation of the glaciers has allowed to evaluate the deglaciation, in terms of surface reduction (km<sup>2</sup>), loss of ice volume (Mm<sup>3</sup>) and rise of the Equilibrium Line Altitude (ELA, m above sea level). During the PEH, the glaciers reached an area of 52 km<sup>2</sup> and a volume of 2041 Mm<sup>3</sup>. In addition, the ELA depression dropped to 4985 m, so that the area of glacial accumulation covered an interval of 505 m between the ELA and the maximum altitude of the ice tongues (5490 m). These results allow to quantify the subsequent deglaciation, in regard to the dimensions reached in the last glacier expansion. In 1962, the area (32 km<sup>2</sup>) had decreased by 62%, the volume (951 Mm<sup>3</sup>) by 47% and the ELA (5038 m) had risen 53 m, shortening the interval of the accumulation zone to 452 m. Compared to the last advance (in 2016). The surface of the glaciers (14 km<sup>2</sup>), was reduced by 73%, the volume (242 Mm<sup>3</sup>) by 88% and the ELA (5164 m) had risen by 179 m. This meant that the range of the accumulation zone had decreased to 326 m. In percentage terms, the decrease in the surface area is similar in both periods, 1962-2016 (56%) and PEH-1962 (62%). However, the reduction in volume is significantly higher in 1962-2016 (75%) than in PEH-1962 (47%). The ELA trend also seems to confirm the acceleration of deglaciation, because its rise during the 1962-2016 period (126 m) doubled the increase observed during the PEH-1962 period (53 m).

**Keywords:** deglaciation, glacier surface, glacier volume, ELA

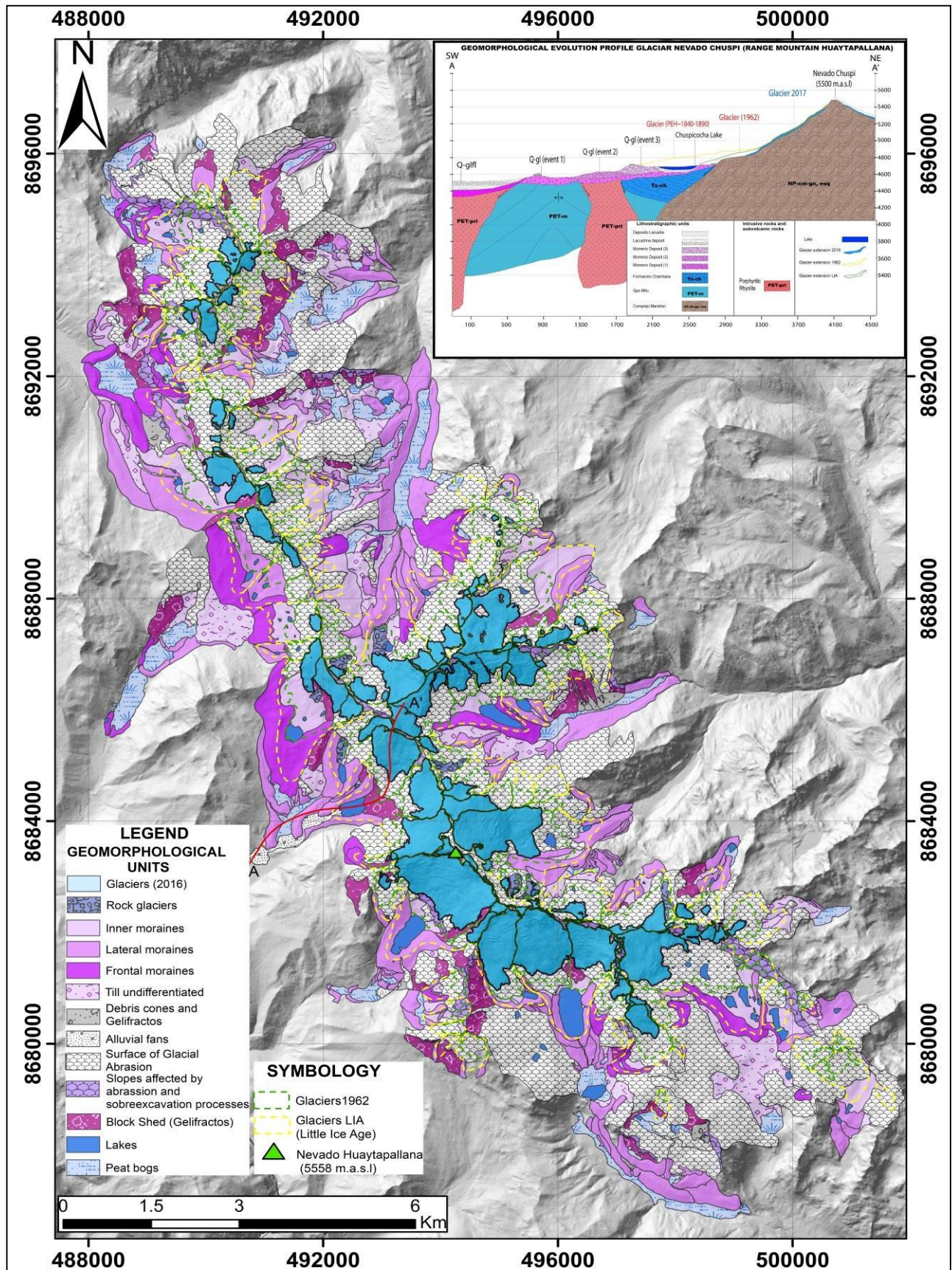


Figure 1. Map and profile (Nevado Chuspi) of glacial geomorphological evolution of the Huaytapallana mountain range.